Microcomputer Products

Catalog No. 2

Midwest Scientific Instruments

Midwest Scientific Instruments, Inc. was founded in 1970 for the purpose of developing low cost laboratory data acquisition computer systems. The vast experience of MSI personnel in the fields of lab research, biochemistry, and computer technology led to the development of small general purpose computer systems and peripherals.

In recent years, the primary emphasis of MSI has shifted from custom "design/build" computer systems to O.E.M., and general purpose systems. The success of the MSI FD-9 Floppy Disk Memory System, and the new MSI 6800 Computer System has enabled MSI to set new levels of sales in the past two years.

In order to keep up with sales which are expected to double again in 1978, MSI has expanded the staff and begun construction plans for a new building to be completed in 1978.

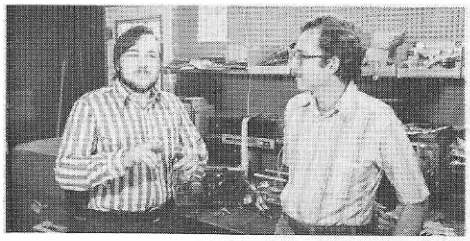
Principal staff members are: Charles C. Childress, Ph.D., John Hopkins University. Dr. Childress is President, and also in charge of new product Research and Development.

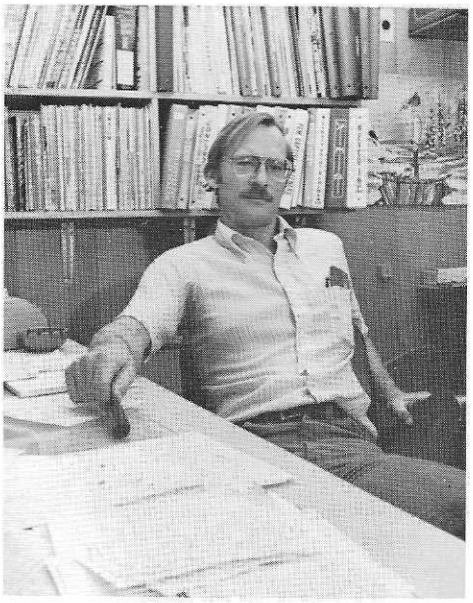
Daryl Lehnert, Vice-President of Manufacturing, is a manufacturing engineer with more than 15 years experience in electronic manufacturing.

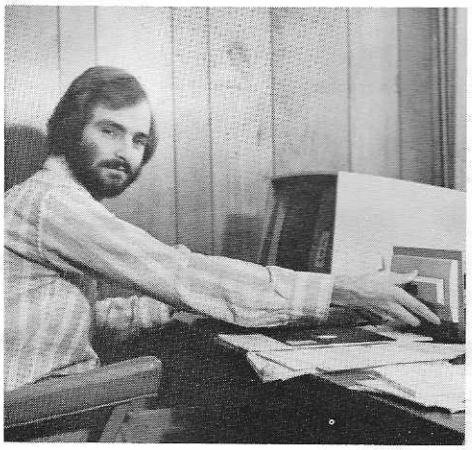
Dr. Steve Rowson who serves as Chief Engineer for MSI. Steve holds a Ph.D. in computer science and electrical engineering from the University of Kansas. He also serves as project coordinator for Libra Systems, Inc., the law office computer system manufactured by MSI.

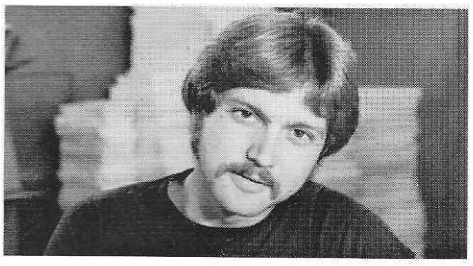
Hal Hoffman, a graduate of Washburn University, is Director of Software Development at MSI.

We at MSI have many years experience in the manufacture of microcomputer products and peripherals. Our goal is the development of extremely reliable, low cost, products which allow the user to maintain control of his system and the flexibility to make it meet his specific needs.









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Dear Friends:

1977 was a very good year for MSI. Our sales were the highest in our seven year history and we expect they will double again in 1978. To keep up with this tremendous growth, we have added many new employees and will soon begin construction of a new building which will triple the size of our present facility.

We especially want to thank our many fine customers who have been so patient and understanding about our growing pains. We weren't always prepared for the tremendous response we have enjoyed, so if we have not yet responded to your letter inquiries, we will be doing so in the very near future. Our present situation is much improved and we are working harder than ever to give prompt response to both inquiries and orders.

We are introducing several new hardware and software items in this catalog. Most important is the new MSI 6800 Computer System. We spent more than two years designing and engineering our system to overcome the engineering disadvantages of existing 6800 computers. We believe it is a superior product. We will be introducing several more new products in the coming months, several of which are mentioned in this catalog.

Several new items of software are available for our FD-8 users. The excellent new TSC Text Editor is now available in an FD-8 version which allows editing and assembly of very long Source Files. A 6800 BASIC Compiler is also available for the FD-8. It is complete with data file handling capabilities and many other desirable features. This greatly increases the execution speed of BASIC. We also have a recent engineering change bulletin which increases the reliability of the FD-8 tremendously.

Our new Reverse Assembler is fantastic! It produces a disassembly complete with labels and symbol table, and places the newly created source code on disk where it can be edited and reassembled.

These programs and hardware are described in detail in this catalog. There is also a Question and Answer section.

MSI has established a users group to facilitate the exchange of disk software and other information of general interest. A periodic newsletter will be published in this regard. Details about this publication will be forthcoming.

In closing, let me again express our appreciation for all the support and encouragement you have given us this past year. We will continue to do our very best in the coming year to provide you with the quality products and personal service we believe to be so very important.

Charles C. Childress Ph.D.
President

Midwest Scientific Instruments

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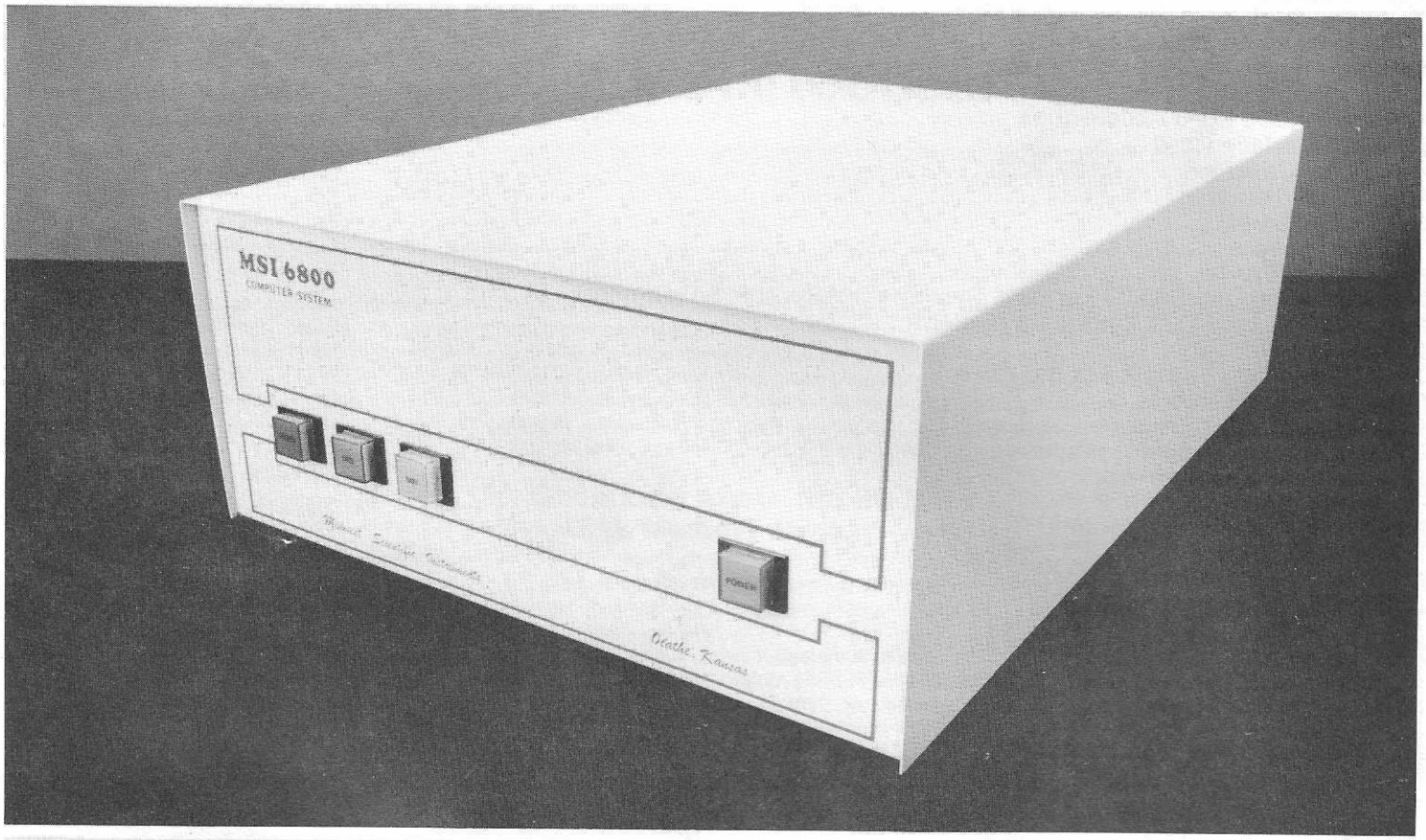
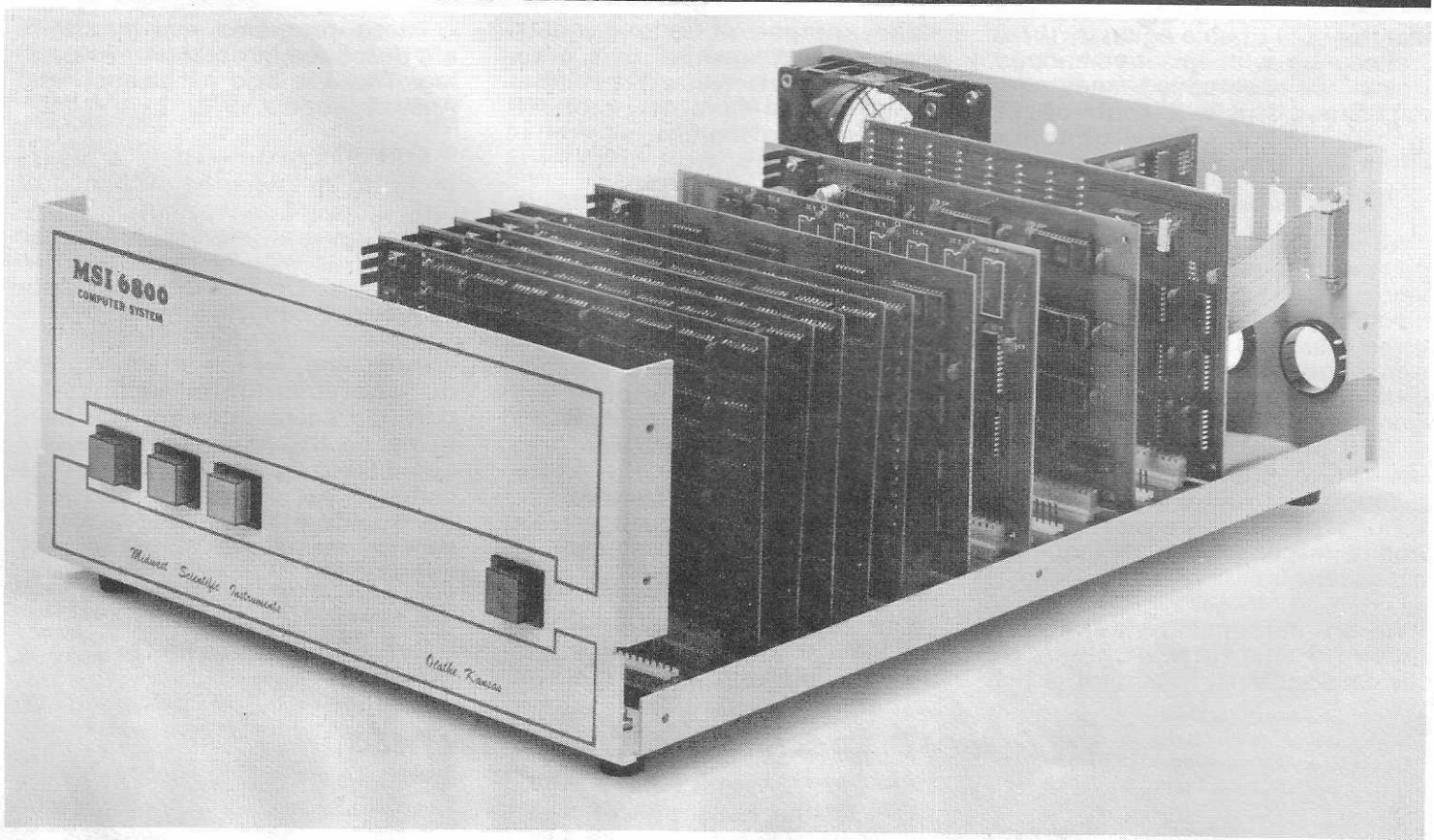
TELEX 42525 (MSI A OLAT)

The New MSI 6800 Computer System

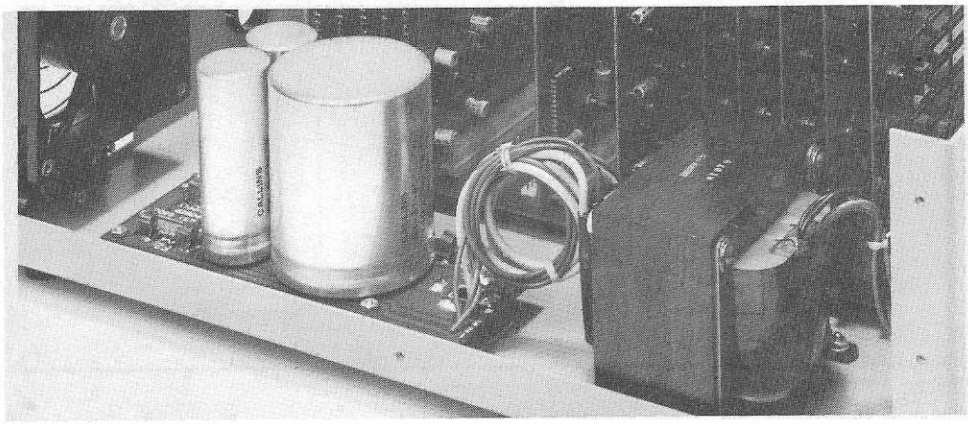
The MSI 6800 computer system is designed to overcome all of the engineering disadvantages and weaknesses of existing 6800 systems. The MSI 6800 is a high quality computer suitable for use in business, industrial, or educational environments. The MSI system employs the popular SS-50 bus architecture. The excellent features of each module of the MSI 6800 are described below. Individual modules of the MSI system may be used to upgrade an existing SWTP 6800 system if desired.

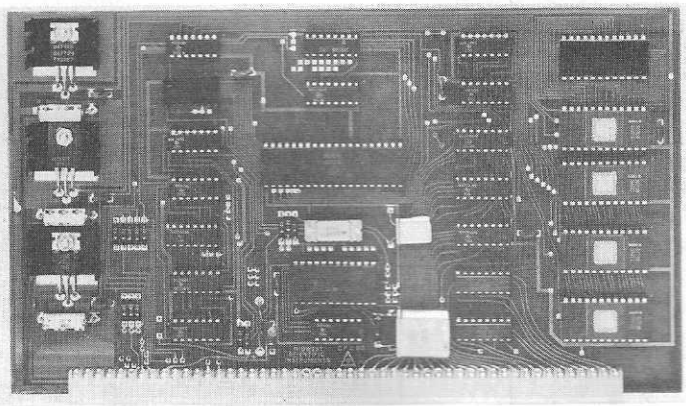




Power Supply

The power supply section of the MSI 6800 system is designed to deliver 5 V.D.C. at 20 amps to allow a full 56K of RAM and/or PROM to be used if desired. The plus and minus 15 V.D.C. supplies are designed to deliver 3 amps each for adequate capacity in powering PROM boards and other devices. The power supply is physically compact and easy to assemble being located on a single heavy duty circuit board which also supports all power supply components. All D.C. circuits are fused separately and individually. The power transformer is furnished with a split primary for 220 V.A.C. 50 Hz operation. The primary is also tapped to permit line voltages from 105 V.A.C. to 125 V.A.C. (210 V.A.C. - 250 V.A.C.) to be used.





CPU Board

The MSI CPU Board contains sockets for 4K of EPROM memory, 128 bytes of RAM, in addition to a restart vector PROM. A 14411 baud rate generator as well as a 6875 clock generator are included on the CPU Board. This permits the system clock to be run at 2 MHz, separate from the baud rate generator if desired. The CPU is delivered with one PROM containing the new MSI monitor software. All EPROM sockets are strappable to any desired high order address. An extended monitor, as well as MSI disk software, are available on PROM as options. The MSI monitor employs an ACIA interface rather than a PIA. The monitor is MIKBUG compatible, but contains many improved features and functions.

DMA control, dynamic memory refresh request/grant, and slow memory control lines are all available on the MSI CPU card. These options are strappable to unused mother board bus lines as desired. The circuit board is fully solder masked and silk screened for the greatest ease of assembly.

The New MSIBUG Monitor

Our new, improved monitor PROM is MIKBUG compatible since the addresses of all the major routines have been preserved. However, only ACIA interfaces are used, at addresses $F500 and $F508 for compatibility with the MSI 6800 system. The monitor RAM area is located from $F000 - $F07F.

Many improvements have been made and new features added which make the MSIBUG much more desirable and easier to use. These are outlined below:

Features of the MSIBUG Monitor

1. Memory examine and change which has the ability of advancing forward, backward, and receiving a new memory address without returning to MSIBUG control (asterisk).

2. Execution of user program function by simply typing "GXXXX".

3. Programs may be loaded or punched at either I/O port O or 1 with optional echo on control port O. This permits our new cassette interface to be positioned at port 1 to send and receive data at different baud rates than the control terminal on port O, without changing or switching baud rates or straps.

4. A flexible software interrupt routine (3F) which allows the user to change a flag in RAM to utilize his own breakpoint software, if desired.

5. A CPU register dump to the terminal by typing an "R". This function normally occurs on a software interrupt.

6. A "list" function which displays one, two, and three byte instructions on the same line of the control terminal for greater ease of interpretation.

7. A "Start/Stop" function is available in the output character routine by typing a "Control S." This allows listings of any kind to be temporarily interrupted to facilitate reading by the operator. Typing "Control S" again causes the listing to resume.

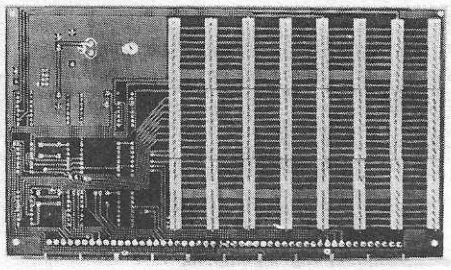
8. A "Control E" causes the output character routine to be turned off allowing the rapid return to the monitor.

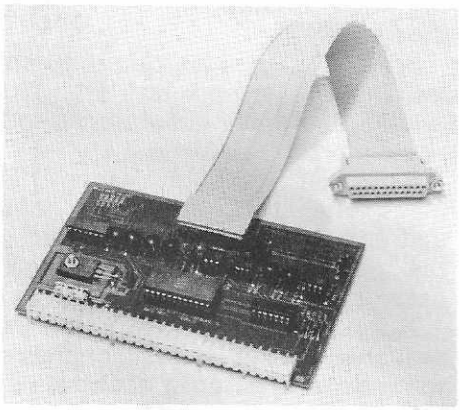
9. A "Checksum" routine allows a three-byte checksum to be calculated for any desired block of memory. This is convenient during program debugging, to ascertain whether or not changes in a memory area have occurred.

10. An automatic jump to the MSI extended monitor is also provided. The extended monitor contains many other desirable and handy aids for the programmer.

Interface Adapter Board

An Interface Adapter Board is employed to accommodate smaller interface cards. The adapter card is strappable to any desired high order interface address, but is normally used at $F500 in the MSI 6800 system. The adaptor board is strappable so as to furnish either 4 or 8 decoded addresses to each of 8 I/O slots. This permits more sophisticated I/O cards, having more than one PIA chip, to be used on any given I/O port. The MSI standard uses 8 addresses per slot. It is bus compatible with SWTP interface cards.



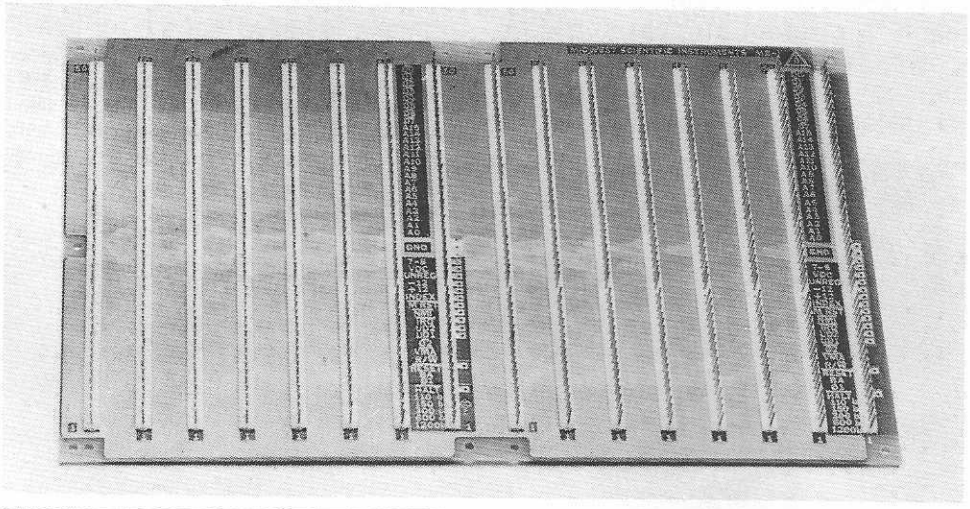


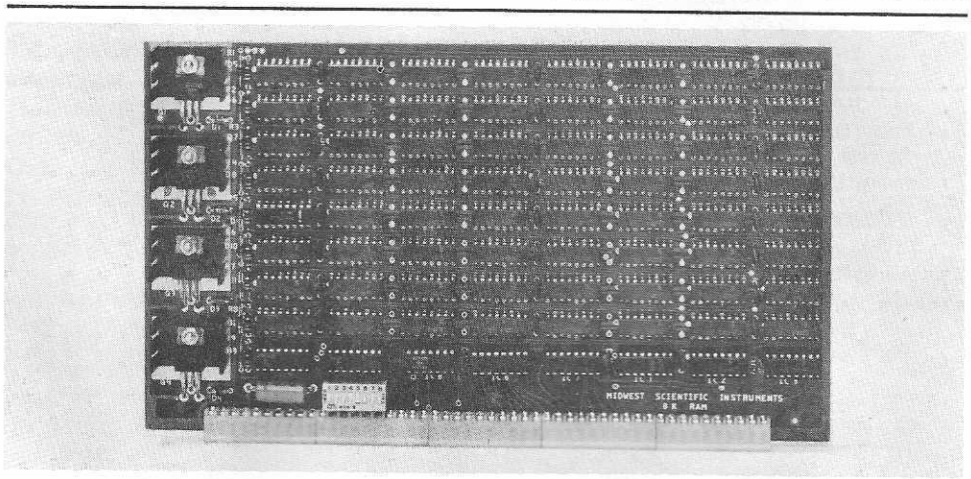
Interfaces

All MSI serial interface cards employ ribbon cable connectors from the board to a DB-25 connector on the rear panel of the computer. All strappable options, such as baud rate and clocks, are available so that each terminal's plug can properly configure the system straps without alteration of the interface board itself. On the serial interface card (SI-1), two separate RS-232 inputs and outputs are provided as well as current loop I/O. Full control of "Data Carrier Detect" (DCD) and "Request to Send" (RTS) is provided as well as an RS-232 input for "Clear to Send" (CTS). This allows full communication capability with data sets or modems.

Mother Board and Chassis

The Mother Board contains 16 positions for full sized system boards. The board is heavy duty and is fully solder masked for ease of assembly. Gold connectors are used throughout for maximum corrosion resistance. Front panel push buttons for power, reset, IRQ, and NMI are provided. The MSI Interface Adapter board must be used in conjunction with the Mother Board if interface slots having decoded addressing are required.





Memory Options

The MSI 6800 system is delivered with 8K of 21L02 memory using the MSI RAM-68 8K memory board. Any SS-50 memory is compatible with the MSI system. All memory addresses are fully decoded so as to allow any combination of RAM and PROM to be employed from $0000 to $DFFF in memory (56K). Locations $E000-$E3FF are used by the MSI monitor. Locations $E400-$EFFF are available for user EPROM or for the MSI extended monitor. EPROM locations $E400-$EFFF may be optionally strapped at $FXXX if desired. Monitor RAM area is located at $F000. Interface addresses are located at $F500-$F7FF.

The MSI EPR-8 8K EPROM board or the PRR-68 PROM RAM board may be used in the system as desired.

General Information

All MSI circuit boards are solder masked and silk screened for the greatest ease of assembly. All modules of the MSI 6800 system are downward compatible with the SWTP 6800 system. The power supply, mother board, and interface adapter board may be conveniently used to beef up a SWTP 6800 system allowing it to easily run a full 32K of memory along with some PROM or EPROM. Individual modules of the MSI 6800 system are available for this purpose. The MSI serial interface boards may also be used in the SWTP system.

Power

MSI 6800 Computer System is available in both 110 V.A.C. 60 Hz and 220 V.A.C. 50 Hz versions. Please specify which.

Dimensions

20" deep, 16" wide, by 7" high

Prices

All Prices F.O.B. Olathe, Kansas

Cat. No.	Description	Price
MSI 6800	Computer System Kit (Includes: Chassis & Hardware, Power Supply, Mother Board & Connectors, CPU Board & Monitor, 8K RAM Memory Board, Interface Adapter Board, Serial Interface Board)	$595.00
MSI-6800W	Computer System Wired & Tested (Contains all the above)	$895.00
CH-1	Chassis & Hardware Kit	$ 45.00
PS-1	Power Supply Kit	$ 72.00
PS-1W	Power Supply Wired	$105.00
MB-1	Mother Board & Connectors Kit	$ 85.00
MB-1W	Mother Board & Connectors Wired	$135.00
CP-1	CPU Board & Monitor Kit	$171.00
CP-1W	CPU Board & Monitor Wired	$250.00
RAM-68	8K RAM Memory Kit	$225.00
RAM-68W	8K RAM Memory Wired	$335.00
IA-1	Interface Adapter Board Kit	$ 54.00
IA-1W	Interface Adapter Board Wired	$ 81.00
SI-1	Serial Interface Board Kit	$ 58.00
SI-1W	Serial Interface Board Wired	$ 87.00
MT-1	MSIBUG Monitor (2708 EPROM for use in the MSI 6800 System. RAM at $F000, I/O at $F500)	$ 60.00
MT-2	MSIBUG Monitor For SWTP (2708 EPROM for use on MSI CPU Card (CP-1) in a SWTP 6800 System. RAM at $A000, I/O at $8004)	$ 60.00
CFN-1	Cooling Fan (Optional)	$ 25.00
MS-M	MSI 6800 System Manual (Included with system purchase. Price of manual will be credited when MSI 6800 is purchased)	$ 35.00

Recommended Equipment Configurations For Various Applications

Group I

This package is recommended for users having their own CRT terminals and/or printers. This suggested system will provide adequate memory for running MSI TAPE BASIC and is an excellent starter system. It may be expanded at any time by adding additional memory and peripherals.

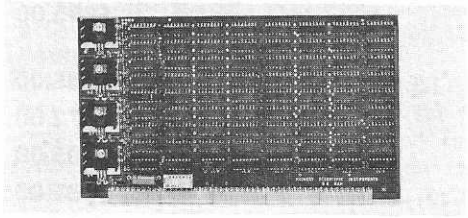
		Kit	Wired
1 ea	MSI 6800 Computer System (with 8K memory & interface board for one terminal)	$595.00	$895.00
1 ea	RAM-68 8K memory board	$225.00	$335.00
1 ea	Audio cassette interface	$ 75.00	$105.00
1 ea	MSI TAPE BASIC	$ 65.00	$ 65.00
		$960.00	$1400.00

Group 2

This package is recommended for the serious business user. The system suggested below will provide adequate memory for running MSI extended DISK BASIC or our new BASIC COMPILER, both with disk data files. Business application programs can be run with ease and reliability on this MSI system.

		Kit	Wired
1 ea	MSI 6800 Computer System (with 8K memory & interface board for one terminal)	$ 595.00	$ 895.00
3 ea	RAM-68 8K memory boards (to make 32K total memory)	$ 675.00	$1005.00
1 ea	FD8DW Dual Drive Disk Memory System	$1950.00	$2295.00
1 ea	PIA-1 Interface Card (for Disk Memory)	$ 49.50	$ 65.00
1 ea	MIN-27-C PROM Bootstrap	$ 80.00	$ 80.00
1 ea	MSI Disk Extended BASIC Interpreter	$ 65.00	$ 65.00
1 ea	MSI BASIC Compiler	$ 330.00	$ 330.00
1 ea	B-100 CRT Terminal	$1400.00	$1400.00
1 ea	HSP-1 High Speed Printer	$1195.00	$1195.00
		$6339.50	$7330.00

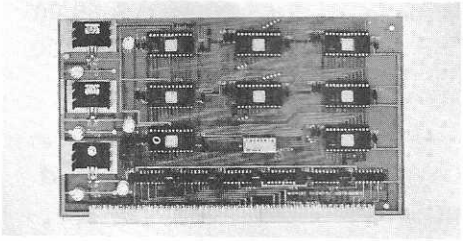
8K Ram Board For MSI & SWTP 6800 Computer Systems



The MSI 8K RAM Board is designed to plug directly into the main 50 pin bus of the MSI 6800 and SWTP 6800 systems. The board contains 64 21L02 RAM chips to provide a total of 8,192 bytes of memory. Four 7805 regulator packages are included on the board to provide the regulated 5V. power supply to the memory chips. A DIP switch is provided to allow the board to be strapped to any beginning 8K segment of memory. A provision for battery back-up is included to preserve memory during power failure. The circuit board is completely solder masked and silk screened for the greatest ease of assembly.

Cat. No. RAM-68 8K RAM Board Kit $225.00
Cat. No. RAM-68S Kit with sockets included $260.00
Cat. No. RAM-68W 8K RAM Board Wired $335.00
Cat. No. RAM-68SW Wired with sockets $370.00
Cat. No. RAM-S Socket Kit only $35.00

8K EPROM Board For MSI & SWTP 6800 Computer Systems

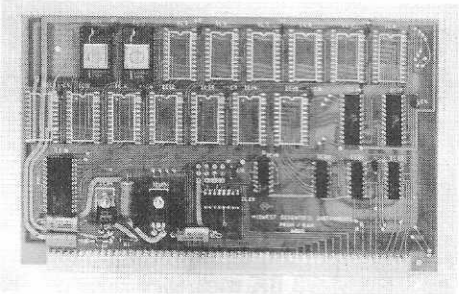


The MSI EPROM Board is designed to use the new fast access, UV erasable 2708 EPROMs. The board occupies an 8K memory segment. It is designed with a Molex bus connector ready to plug into the main 50 pin bus of the MSI 6800 system. When the EPROM board is used in the SWTP 6800 computer system, the Model HDT-1 transformer should be used in order to insure adequate regulation on the +12V bus. The board contains positions for eight 2708 EPROM chips for a total of 8,192 bytes. Each EPROM chip occupies 1K of memory (1024 bytes). A DIP switch is provided to allow the board to be strapped to any beginning 8K segment of memory.

The kit includes all TTL Integrated circuits, discreet components, and connectors. EPROM chips are not included. The EPROM Board is coated with solder mask and is silk screened for the greatest ease of component location and assembly.

Cat. No. EPR-8 8K EPROM Board kit $95.00
Cat. No. EPR-8S Kit with sockets included $110.00
Cat. No. EPR-8W 8K EPROM Board, wired $150.00
Cat. No. EPR-8SW Wired with sockets $165.00
Cat. No. EPR-S Socket kit only $15.00
Cat. No. HDT-1 Heavy duty transformer $17.50

PROM/RAM Board For MSI & SWTP 6800 Computer Systems



The MSI PROM/RAM Board is designed to occupy a 4K memory segment. It is designed with a 50 pin Molex bus connector ready to plug into the main bus of the MSI 6800 and SWTP 6800 systems. The board contains positions for fifteen 1702A PROM chips for a total of 3,840 bytes. Each PROM chip occupies one page of memory (256 bytes), and is addressed from XXOO to XXFF. In addition, one page of random access memory (RAM) is also provided on the board, which normally occupies the top page of memory and is addressed from XFOO to XFFF. Jumpers are provided to allow the board to be strapped to any beginning 4K segment of memory. The PROM/RAM Board can contain an independent program module, including its own stack area and temporary storage registers. This feature allows the module to plug directly into a system and run without requiring any user RAM. The PROM/RAM Board is coated with solder mask and is silk screened for the greatest ease of component location and assembly.

PROM Chips

The PROM/RAM Board is designed so as to not use Phase 2 of the system clock in the memory address decoding scheme. The PROM chips and bus drivers are then enabled upon presentation of an address and the valid memory address signal. Since the system presents memory addresses shortly after the leading edge of the Phase 1 clock signal, and reads data near the trailing edge of the Phase 2 clock signal, this gives a maximum memory access time of approximately 900 nanoseconds which can be tolerated. The PROM chips which are used with this board must have an access time which meets these requirements. PROM chips having an access time specification of 700 nanoseconds are recommended for use with this board. If lower quality PROM chips are used, then a circuit which lengthens Phase 2 of the system clock may be employed. One jumper may be added on the circuit board so as to provide a slow memory signal each time the PROM/RAM Board is addressed.

Restart Vector

If you desire to use the PROM/RAM Board to provide your own restart vector rather than having your system go to the MIKBUG start-up routine, then a simple modification may be performed. Complete documentation for the restart vector modification is included with the kit. The kit includes all TTL integrated circuits, discreet components, and connectors. PROM chips are not included.

Power Requirements

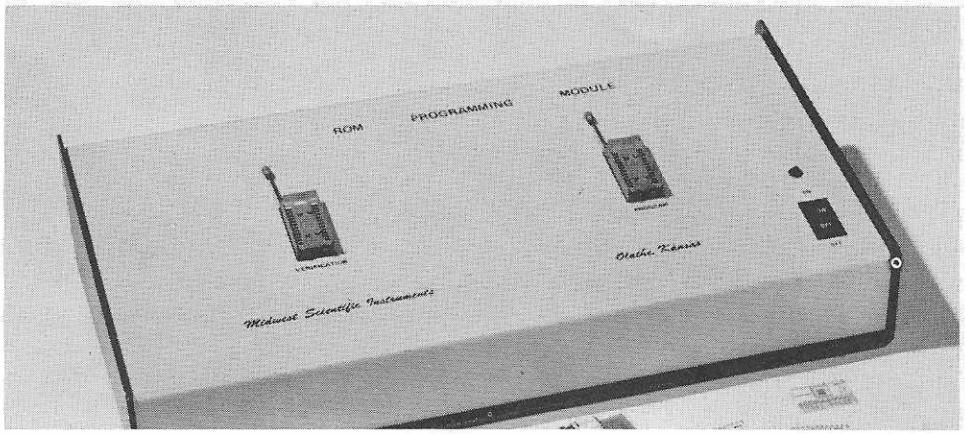
+5V. D.C. 1.1A
-12V. D.C. 400ma

These current requirements are given for a board fully populated with fifteen 1702A PROMs.

Cat. No. PRR-68 PROM/RAM Board kit $95.00
Cat. No. PRR-68S Kit with sockets included $120.00
Cat. No. PRR-68W PROM/RAM Board, wired $150.00
Cat. No. PRR-68SW Wired with sockets $175.00
Cat. No. PRR-S Socket kit only $25.00

PROM Programmer and Verification Module

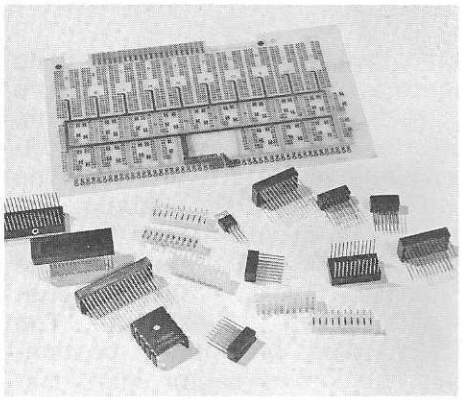
Program Your Own 1702A PROMs Directly From Memory of Your Microcomputer System



The MSI PROM Programmer is designed to program 1702A PROMs. The programmer interfaces with any microcomputer system via a single PIA chip.

A complete software package is furnished with the system at no additional charge. This gives you the ability to transfer any area of memory to a PROM chip, read the contents of the PROM into memory, calculate checksums for PROMs and duplicate PROMs. Following the programming operation, the software reads the PROM back into memory and compares each step with the memory location from which it was programmed for the purpose of verification. Any discrepancies are listed on the terminal with an error message. If the PROM verification is correct, then a checksum value is automatically printed. Requires the PIA-1 interface card.

Cat. No. PR-1 PROM programmer kit $325.00
Cat. No. PR-1W PROM programmer, wired $475.00
Cat. No. UV-1 UV lamp for erasing PROMs $115.00



EPROM Programmer

The MSI PR-2 EPROM Programmer is designed to plug into the interface bus of the MSI or SWTP 6800 system. The PR-2 programs both the 2708 as well as the 2716 EPROM chips. A zero insertion force socket is mounted external to the computer chassis for easier access to the programming socket. A ribbon cable extends to the interface card.

A complete software package is provided for the 2708 PROM at no additional charge.

Cat. No. PR-2 EPROM Programmer kit $125.00
Cat. No. PR-2W EPROM Programmer, wired $190.00

Wire Wrap Card For MSI & SWTP 6800 Computer Systems

Now You Can Do Your Prototyping With Ease Using the MSI Wire Wrap Card

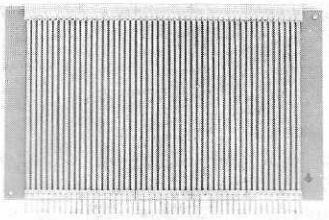
The MSI Wire Wrap Card is designed to plug into the MSI 6800 and SWTP 6800 Computer Bus. The card is 9" wide by 5½" high and contains a 44 pin connector on the top edge of the card for connections to external devices. Molex connectors attach to the bottom edge to allow the card to be plugged into the main 50 pin bus of the 6800 system.

The card contains positions for 38 individual 16 or 14 pin wire wrap sockets. The top two rows are designed to accept either 24 or 40 pin sockets as well. The use of each 40 pin socket sacrifices the availability of two 16 pin positions. If all the 40 pin positions are used, the card will then hold ten 40 or 24 pin sockets and eighteen 16 or 14 pin sockets.

Busing is provided for +5V. and ground as well as a position for a 7805 five volt regulator with heat sink. Additional pads are provided for the installation of discreet components. The kit is furnished with the Molex bus connectors included.

Cat. No. WW-1 Wire Wrap Board kit $25.00
Cat. No. WW-1R Kit with 5V regulator and heat sink included $30.00
Cat. No. WWR Regulator & heat sink only $5.00

Wire Wrap Sockets:
Cat. No. WWS-14 14 Pin, each ..... $.75
Cat. No. WWS-16 16 Pin, each ..... $.80
Cat. No. WWS-24 24 Pin, each $1.50
Cat. No. WWS-40 40 Pin, each $2.50

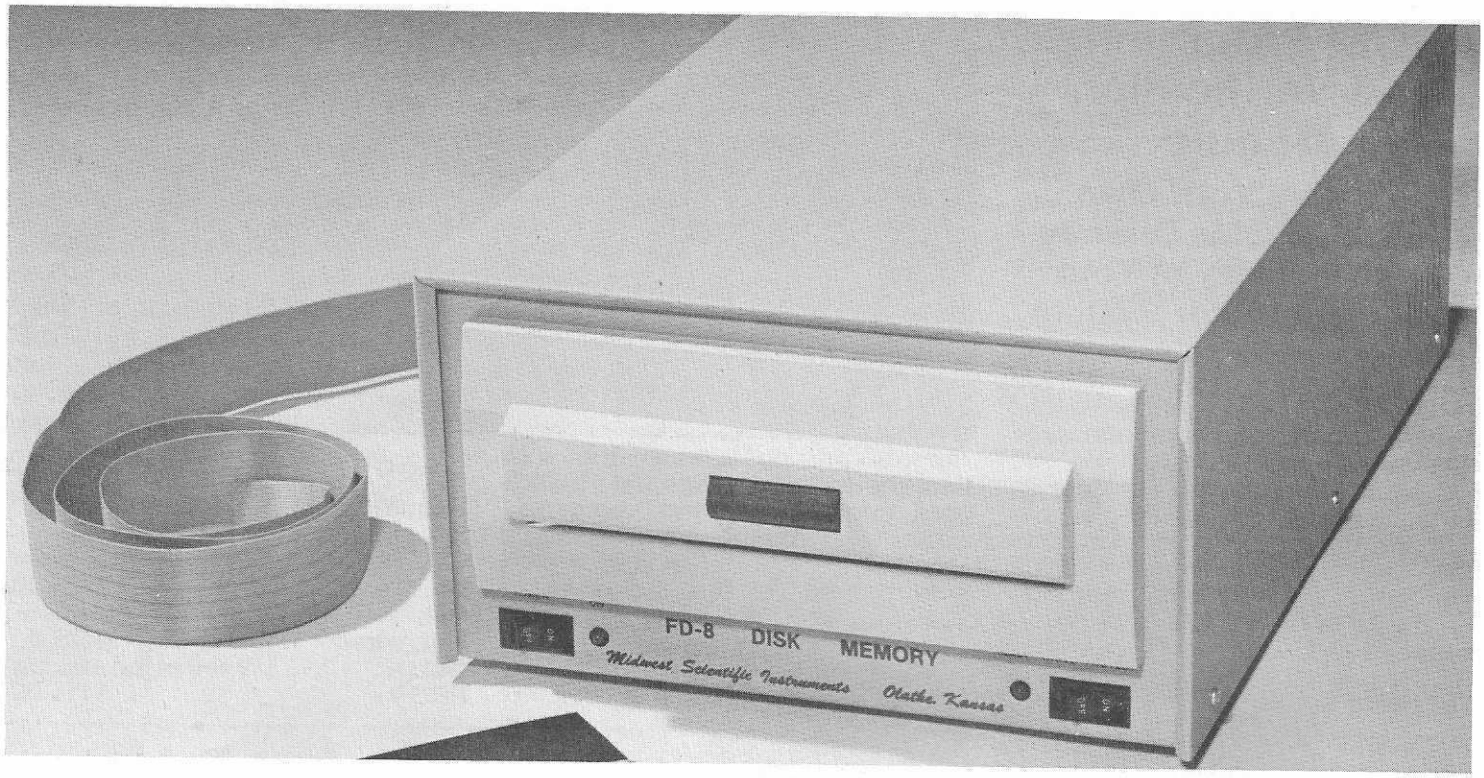


Extender Card

Simplify Your Troubleshooting or Prototyping With the MSI Extender Card

The MSI Extender Card is designed to plug into the MSI 6800 and SWTP 6800 computer 50 pin bus. This card allows other cards residing on the main system bus to be plugged into the extender for easy access for trouble-shooting or prototyping operations. Both female and male Molex connectors are provided with the kit.

Cat. No. EXT-1 Extender Card kit $25.00



FD-8 Floppy Disk Memory System

With the MSI FDOS operating system, the FD-8 now brings a level of performance to your microcomputer which can only be matched by larger computer systems.

The MSI FD-8 Floppy Disk Memory System interfaces to any microcomputer system via a single PIA chip. The FD-8 uses GSI disk drives with each drive housed in its own cabinet complete with power supply. The disk controller board is contained in the same cabinet as the No. 1 drive and communicates to the microcomputer system by means of a small ribbon cable. Up to four disk drives connect to the No. 1 drive by means of a parallel cable. Each additional drive is contained in its own matching cabinet with power supply.

The FD-8 controller board contains a sector buffer. Approximately 3K of RAM is contained on the controller board itself, which allows information to be transferred from controller to disk completely independently from processor speed. In order to execute a transfer, information is first transferred from the main computer memory to the sector buffer RAM, the desired track and sector is then found, and a control bit is used to start the transfer of information. Approximately 512 bytes of memory in the microcomputer system are necessary to house the FDOS bootstrap routine. The complete disk driver subroutines occupy approximately 1K of memory and are loaded by the bootstrap.

The interface to the microcomputer system is by means of a single PIA chip. One half of the chip is utilized as an eight bit bidirectional port for data flow and status information. The second half of the PIA is used as an output control port. The MSI PIA-1 parallel interface card is all that is needed for SWTP 6800 systems. An 88-4PIO interface card will handle the interfacing job for Altair and IMSAI 8080 systems.

The FD-8 uses hard sectoring and writes 256 data bytes per sector. Available software includes all of the driver subroutines and MINI-DOS routines which allow the user to read or write any desired number of sectors to and from a desired starting location on the disk and any desired location in computer memory. On write operations, we read back after write to check for errors in order to insure correct transfer of the information. Error routines are part of the software and indicate to the user the nature of the error, should one occur. Error messages include "Disk Not Ready," "Fault," "Write Protect," "Track or Sector Identification," and "Checksum." The FD-8 writes preambles, postambles, track and sector identification, and checksum on each sector of the disk.

The MSI FDOS Floppy Disk Operating System is available for 6800 based systems. A complete description of the features of our operating system is given in this catalog (see page 15). For 8080 based systems, our disk driver routines and MINI-DOS may be integrated with BASIC via user-defined subroutines.

The FD-8 System is furnished with complete manuals and documentation including schematics, assembly manual, trouble-shooting and waveform analysis guide, operating instructions, complete source listings of disk driver, diagnostics, and MINI-DOS software routines. The FD-8 System includes disk drive, controller board, power supply, and cabinet. Driver routines, diagnostics, and MINI-DOS are furnished on tape cassette with the system.

Format Specifications:

77 tracks per diskette
16 sectors per track (hard sectored)
256 data bytes per sector
315,392 data bytes per diskette

Performance Specifications:

360 RPM rotational speed
8 msec track-to-track access time
40 msec head engage time
10 msec sector read/write time
83 msec average latency time

Dimensions:

20" deep, 12" wide, by 7" high

Power Requirements:

115VAC/60 Hz at 1.5A. Max
230VAC/50 Hz at 0.75A. Max

Power

MSI FD-8 Disk Memory System is available in both 110 V.A.C. 60Hz and 220 V.A.C. 50Hz versions. Please specify which.

Prices

Cat. No. FD-8 Single drive kit $1,150.00
Cat. No. FD-8D Dual drive kit $1,950.00
Cat. No. FD-8W Single drive, wired & tested $1,395.00
Cat. No. FD-8DW Dual drive, wired & tested $2,295.00
Cat. No. FD-S Socket set for FD-8 Controller $40.00
Cat. No. FD-M MSI Disk System Manual $35.00
(Included with system purchase. Price will be credited when MSI FD-8 is purchased)

Diskettes

Floppy Disk cartridges for use with the FD-8 Floppy Disk Memory System are manufactured under the MSI label by a well-known media supplier. Although floppy diskettes may be obtained from a variety of sources, our diskettes are certified to work satisfactorily with the drives used in the FD-8. Several years of experience with our existing manufacturer has proven these diskettes to be among the most reliable of any available sources.

Two sided "flippy floppy" diskettes are now available. Each diskette contains two offset index/sector holes to allow recording on either side of the diskette.

Cat. No. DSK-1 Diskettes, each $15.00
If purchasing 5 or more, each $12.00
Cat. No. DSK-2 Two sided diskettes, each $18.00
If purchasing 5 or more, each $15.00

Diskette Hardholes

Protect your diskettes with Mylar HARDHOLES. Diskettes can be damaged by improper insertion, slippage of the clamping hub, or improper alignment. HARDHOLES provide a tough surface for the clamping hub to grip. Diskette damage and wear is reduced and difficulties resulting from high friction diskettes eliminated.

Cat. No. HDH-1 Box of 50 diskette Hardholes $12.00
Cat. No. HDT-1 Hardhole mounting tool $9.00

Additional Disk Drives

Up to three additional drives may be added to any FD-8 system by simply adding additional signal cables which hook in parallel on the drive. The controller board contains the capability for selection of any of four drives under software control. Each additional drive is furnished in its own matching cabinet with power supply and signal cables.

Cat. No. FD-8AD Additional Drive, each $900.00

Recommended Accessories For FD-8 Disk Systems

The following items are desirable for use with most FD-8 systems:

System Software Diskette containing all disk routines including MSI Disk Extended BASIC, assembler/editor, and complete disk operating system.

Cat. No. SDSK-B $65.00

Interface Card which allows the FD-8 disk system to plug directly into the interface bus of the MSI 6800 or SWTP 6800 computer systems.

Cat. No. PIA-1 Kit $49.50
Cat. No. PIA-1W Wired $65.00

Bootstrap PROMS which allow the FD-8 disk operating system to be loaded instantly on power-up are essential to efficient use of the FD-8 system. Both 1702A and 2708 EPROMS are available as described below:

Cat. No. SHB-17 Shortboot PROM Set on 1702A PROMS for use in the MSI PROM/RAM Board (PRR-68) **$125.00**

Cat. No. MIN-17 MINI-DOS, disk driver, and bootstrap PROM set on 1702A PROMS for use in the MSI PROM/RAM Board (PRR-68) **$250.00**

Cat. No. PRR-68 PROM/RAM Board kit (see page 8) ... **$95.00**

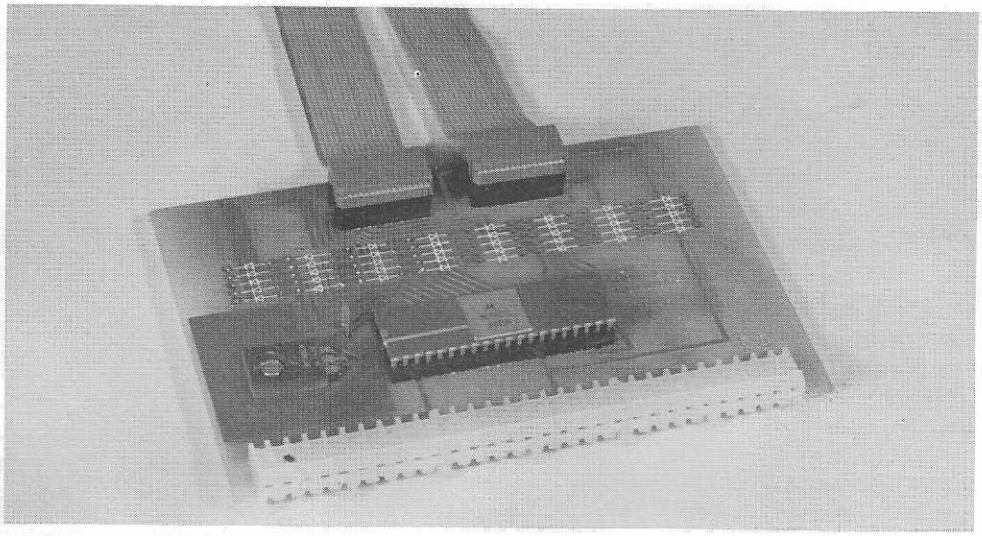
Cat. No. MIN-27C Disk Driver and bootstrap 2708 PROM for use on the MSI 6800 CPU Board (CP-1) (ORG $EC00) **$80.00**

Cat. No. MIN-27E Disk Driver and bootstrap 2708 PROM for use on the MSI EPROM Board (EPR-8) (ORG $C000) ... **$80.00**

Parallel Interface Card

The MSI Parallel Interface Card utilizes the 6820 PIA chip. The card is designed to plug directly into two 16 pin ribbon cable connectors such as that used with the FD-8 Floppy Disk Memory System. Provision has been made for all signal lines from the PIA chip to be protected with diode clamps to the +5V. supply and to ground if desired. The system RESET line, +5V. supply, and ground are all brought to the ribbon cable connector in addition to all of the signal lines from the PIA chip. The card is designed to plug directly into the interface bus of MSI 6800 and SWTP 6800 computer systems. Connectors are provided to allow the ribbon signal cable for the FD-8 Floppy Disk System to plug directly into the card. The kit includes all components and connectors. Diodes are not included.

Cat. No. PIA-1 Parallel Interface kit $49.50
Cat. No. PIA-1W Parallel Interface, wired $65.00



Data Tape Cassettes

Cassettes used for data and program storage require the best in mechanical precision and the finest in error-free tape.

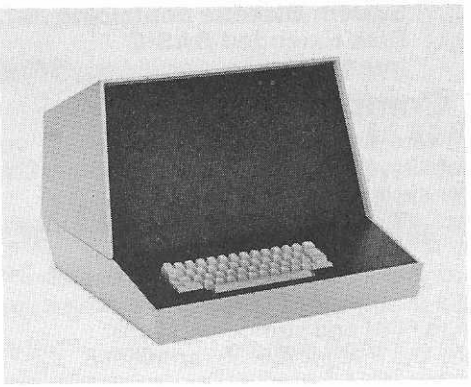
MSI cassettes are precision molded from high impact plastic. These cassettes maintain close dimensional tolerances even if dropped. They are stable under widely varying humidity and temperature conditions.

MSI employs a unique and proprietary process to optimize digital tape magnetic properties. Tape is buffed to loosen oxide dust and backing particles, then cleaned to remove foreign materials. Cleaned tape is then loaded into the cassette without splicing. In this manner, your tape pack is one homogeneous unit, without leader splices which deform the pack and create incipient failure.

If you get the idea that MSI data cassettes are something special - you're right! The finest cassette, the finest tape, the most careful processing - anywhere! The most reliable for your data storage.

All MSI data cassettes are assembled and tested in the U.S.A.

Cat. No. MSI-6 6' (2 Program Blocks) $3.75
Cat. No. MSI-30 30' (10 Program Blocks) $4.00
Cat. No. MSI-40 40' (13 Program Blocks) $5.00



MCRT-E

The Model MCRT-E is a professional CRT enclosure. It is constructed of high impact structural plastic and is furnished with a smoked plexiglass screen and a removable keyboard mounting plate routed to accept the SWTP KBD-5 keyboard. A blower opening and ventilation grills are provided. Uncut keyboard mounting plate also available. Beige with brown keyboard cover.

Cat. No. MCRT-E **$89.50**

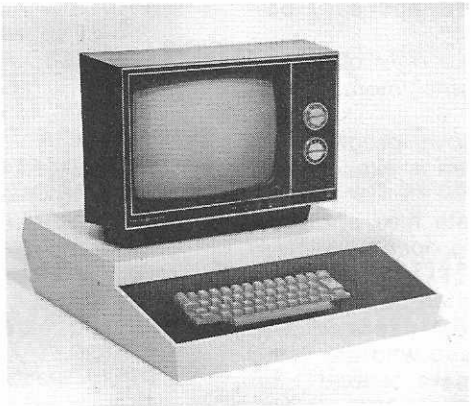
Enclosures For CRT'S & TV Typewriters

Two CRT enclosures are offered which may be used for your own CRT or TV typewriter.

B-100 CRT Terminal

MSI recommends the use of a high quality CRT terminal for business applications. The B-100 has 80 characters per line with a 24 line display. A 12 inch monitor is used which has upper/lower case display capability. RS-232 or current loop interface, addressable cursor and selectable baud rate are standard features. Expansion options include formatting, editing, blink, and 16 function keys.

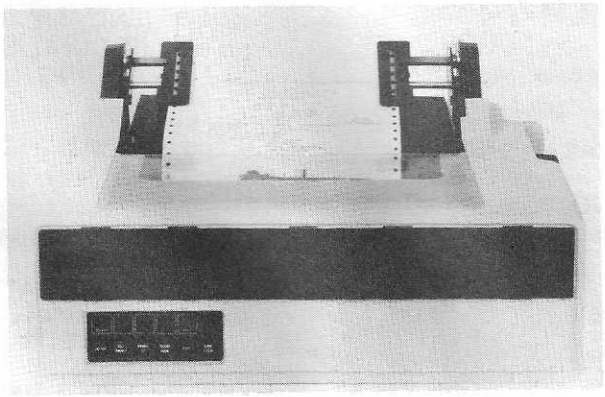
Cat. No. B-100 CRT Terminal complete **$1,400.00**



TVTE

The TVTE enclosure is designed specifically for the SWTP CT-1024 TV typewriter terminal. It is constructed of high impact structural plastic with removable lid. The removable keyboard cover has been routed to accept the SWTP KBD-5 keyboard. Plenty of room is provided inside to house the CT-1024 Circuit Boards and power supply. Beige with brown keyboard cover.

Cat. No. TVTE **$54.95**



High Speed Printer

The Model 779 is a high speed dot matrix printer. Printing speed is 60 characters per second with a maximum line width of 80 characters. The average speed is 30 lines per minute for full 80 character lines and 90 lines per minute for short 30 character lines. Width of the sprocket feed paper can be varied to 9½ inches maximum. Up to four carbon copies can be produced. The printer input is buffered and prints one line at a time upon presentation of a carriage return command.

Specifications:

Format - 80 characters per line, 6 lines per inch

Printing Rate

Characters - 60 characters per second

Full Lines - 30 lines per minute (80 character line)

Short Lines - 90 lines per minute (20-30 characters)

Character Structure - 5 x 7 dot matrix, 10 point type equivalent

Character Set - Full alphanumeric (upper case only) normal and elongated characters

Copies - Original plus four copies

Control Functions - Automatic form feed, vertical tabs, audio alarm (included in option package)

Cat. No. HSP-779 High Speed Printer **$1,195.00**

MSI Disk Extended Basic For 6800 Systems Both Interpreter And Compiler Versions

Interpreter Features

With MSI BASIC you have compatibility with a large amount of BASIC software as well as the ability to define your own programming language.

MSI 6800 BASIC offers USER DEFINED VERBS in addition to the traditional features of the BASIC language. This means you can add any previously undefined verb into the table and then specify its unique function yourself. This greatly facilitates programming memory utilization. Special verbs "GET" and "PUT" are included in MSI BASIC to simplify the handling of data from Input/Output devices such as the MSI FD-8 Floppy Disk System.

1. User programs may be saved and loaded from either Kansas City Standard tape cassette, paper tape, or MSI's FD-8 Floppy Disk.
2. A string command is available to allow maximum string length to be set to any desired value up to 128 characters.
3. Most function subprograms, including transcendentals, are implemented.
4. Users can call their own machine language programs with the USER function.
5. Interrupts are allowed.
6. Most program statements may be executed in the direct mode for immediate calculations and easy program debugging.
7. The number of significant digits to the right of a decimal point can be fixed for easier implementation of accounting applications.
8. A trace mode is available which allows program line numbers to be printed as the program is executed for use in program debugging.
9. Both random and sequential disk data files are available with a maximum of 3 files being open at a given time.

MSI BASIC occupies 14K of memory when used with the FD-8 Floppy Disk System. However, for users of MSI BASIC who do not have a Disk System, and who are using only paper tape or cassette for program save or load, then BASIC will reside in 8K of memory. The space occupied by disk subroutines is now available for user program area.

- Full floating point arithmetic capability, decimal based for increased precision.
- Handles strings up to 128 characters in length, with a string length command.
- Permits one and two dimensional arrays.
- Handles up to eight levels of nested FORLOOPS.
- Supports a maximum of 8 levels of subroutines.
- Has provisions for on-line real time operation with I/O devices and unique verbs which simplify specialized I/O operations.
- Supports multiple statements on a single line.
- Error routines display the entire offending line as well as the error message.
- Full compatibility with MSI-FDOS software and FD-8 Floppy Disk System.

Complete documentation of Resident I/O routines is provided. This allows the user to use the software with any 6800 system.

MSI 6800 BASIC, available on paper tape, KC Standard tape cassette, or diskette, specify which.

Cat. No. BASI-M — **MSI BASIC Interpreter Manual (Nov '77 Edition) $10.00**
(Included with program purchase. Price of manual will be credited when program is purchased)

Cat. No. TBAS-68P — **MSI Tape BASIC, paper tape $65.00**

Cat. No. TBAS-68C — **MSI Tape Basic, cassette $65.00**

Cat. No. SDSK-B — **System Diskette containing Disk Extended BASIC Interpreter $65.00**

BASIC Compiler Features

With the new Software Dynamics BASIC Compiler, you have increased capability and speed never before possible with a microcomputer system.

The compiler offers all of the features described for our interpreter and many more.

- Up to 15 characters may be used for variable names.
- Single and double dimensioned numeric arrays.
- Long strings (up to 65K) and string operations.
- Decimal (10 digit) and integer (65535) arithmetic.
- Print using statement for formatted output.
- Interface to user routines via "CALL" statement.
- Common statements for variables.
- Chaining.
- Nested conditionals (If, then, else).
- User defined functions.
- Runtime package is re-entrant and interruptable.
- Code is PROMable.
- I/O routine source listings provided.
- Line number tracing, single step, and breakpoint facilities for easy debugging.
- Excellent documentation.

Summary:

Statements	Functions
PRINT	PI
PRINT USING	SIN
FORMAT	COS
LET	TAN
INPUT	ATN
GOTO	LOG
IF-THEN-ELSE	EXP
FOR/NEXT	SQR
GOSUB/RETURN	INT
GOSUB POP	ABS
ON GOTO	SGN
ON GOSUB	ERR (ERROR #1)
ON ERROR GOTO	ELN (ERROR LINE #)
ERROR	LEN (OF STRING)
REM (OR "!")	VAL (OF STRING)
DEF	COM (LOGICAL COMPLEMENT)
END	PEEK
OPEN	EOF (END FILE TEST)
CREATE	NOT (IF COND INVERT)
CLOSE	FIND (STRING IN STRING)
DELETE	MID$
RENAME	LEFT$
PRINT #	RIGHT$
PRINT # USING	DATE$
INPUT #	TIME$
READ # (BINARY)	NUM$ (UNFORMATTED CONVERSION)
WRITE # (BINARY)	NUMF$ (FORMATTED CONVERSION)
RESTORE #	HEX$ (HEX CONVERSION)
CHAIN	SWITCHES$
CALL	POS ( ) (RETURN COL POSITION)
DEBUG	
DIM	
POKE	
PROGRAM	
DATA ORIGIN	

Cat. No. BASC-M — **MSI BASIC Compiler Manual $10.00**
(Included with program purchase. Price of manual will be credited when program is purchased)

Cat. No. SDSK-C — **System Diskette containing Basic Compiler $330.00**

Cat. No. SDSK-CB — **System Diskette containing Disk Extended Basic Interpreter and Basic Compiler $395.00**

MSI FDOS Floppy Disk Operating System For Use With 6800 Systems

The MSI FDOS Operating System is designed to make your 6800 microcomputer system a complete small computer system which can be programmed with ease in both assembler language and BASIC. With our operating system, your computer becomes a real data processing tool suitable for use in business and other environments where its performance can only be matched by larger mini-computer systems. FDOS contains several types of files:

SYSTEM FILES: Allows the user to call system programs such as BASIC by typing the program name only. The user may store his own system program files as desired.

OBJECT FILES: Contains machine level programs or output object code from an assembly. Any block of memory containing an object program may be saved under a desired file name.

SOURCE FILES: Contains text or source programs for the assembler or for the BASIC Compiler. These files may be edited and resaved as desired prior to assembly or compilation.

BASIC FILES: Contains source programs for the BASIC Interpreter which may be edited and resaved as desired. Data files for BASIC programs are also stored on disk and are accessible both sequentially and randomly by BASIC programs.

A short bootstrap program, located on PROM (or may be loaded from tape cassette) is used to bring the Disk Operating System into use. The system responds with "DOS READY" giving the user access to the following commands and system programs:

FILES This command causes the system to list all of the files which are presently within the system. Disk addresses, file size, and file type are printed on the terminal.

CREATE This command allows the user to allocate any desired number of sectors to be reserved for storage of program or data by specific program name. System files may also be created in this manner which are internal and do not appear in the file catalog. A file name must be given at the time the file is created.

SAVE This command allows the operator to store programs into a disk file. Starting and ending addresses of the program to be stored as well as the program's beginning execution address is entered. The file must be given a name, and an optional password may also be entered to protect the file. Passwords do not appear in the catalog and must be kept track of by the user in order to regain access to the protected file. Programs which are saved, without having previously used CREATE, result in an automatic file extension of 25% to allow for future expansion.

PURGE This command allows the operator to eliminate a file on the disk. Features are included which prevent the operator from accidentally purging a file.

INITIALIZE The "INIT" command allows the operator to initialize a new disk which stores FDOS, disk driver routines, and library routines onto a new diskette.

COPY This command allows a diskette to be copied on either a dual drive or a single drive FD-8 Memory System. The routine determines the amount of available memory, loads it full from a source disk, then writes the information on a destination diskette. Depending upon memory size and the amount of valid data on the diskette, the COPY routine may require several transfers of diskettes in order to complete the copy.

RENAME This command allows an existing file on the disk to be renamed.

LOAD The LOAD command followed by a file name permits an existing file to be loaded into the computer. If the file was password protected at the time it was originally saved, then the valid password must be included before the file will be loaded.

RUN The RUN command is used with machine code files and begins execution of the program following its load into memory. The LOAD command alone brings in the program, but does not begin execution.

PACK The PACK command allows information on the disk to be compacted so as to take advantage of file space which is presently unused.

DCORES This command automatically loads the coresident assembler editor package. Source files may now be entered into the system, saved and reloaded on the disk by file name. The source file can be assembled and the object code placed on diskette as desired. Source files which are saved under DCORES appear in the disk file catalog.

TCORES This command allows the object code from an assembly to be placed on tape rather than diskette.

BASIC Typing the command BASIC automatically loads MSI Disk Basic from diskette into the system. The complete features of the MSI BASIC package are described in this catalog (see page 14). While operating in BASIC, programs may be saved and reloaded from the disk by file name. Files which are saved in BASIC also appear in the disk file catalog. Both random and sequential disk data files are available in BASIC. A maximum of three files may be open at a given time.

MINIDOS The MSI MINIDOS routine makes use of the disk driver subroutines and enables the user to read or write any desired number of sectors from a desired starting location in memory to a desired track and sector location on diskette. On write operations, the sector is automatically read back for error-checking and verification prior to writing the next sector.

EDIT Loads the TSC text editor into memory in preparation for editing source files on the disk.

COM This command loads the BASIC Compiler into memory in order to compile a BASIC source program contained on disk. The output from the compiler is placed on disk where it serves as source for the assembler.

ASM Loads the assembler in preparation for an assembly of source output from the BASIC Compiler. The object code generated by this procedure is stored on disk and is ready for execution by the run time program.

RTP This command, followed by the program file name, loads the run time program, as well as the object program, and begins execution. This permits compiled basic programs to be executed approximately 50 times faster than the interpretive mode.

PFILES Allows a complete printout on either the control terminal or a printer of the disk directory. All programs, including system files, are listed showing all disk addresses, program memory locations and starting address for execution. Passwords are not shown.

PFILESP Same as PFILES except that passwords are also listed.

The MSI Disk Operating System is provided at no additional charge with the purchase of an FD-8 Disk Memory System. All programs listed above are included except the BASIC interpreter and compiler for which additional charges are made.

Cat. No. SDSK System Diskette $20.00
(additional updated copies)

Cat. No. SDSK-B System Diskette containing Disk Extended Basic Interpreter . $65.00
(additional updated copies) $20.00

Cat. No. SDSK-C System Diskette containing Basic Compiler $330.00
(additional updated copies) $20.00

Cat. No. SDSK-CB System Diskette containing Disk Extended Basic Interpreter and Basic Compiler $395.00
(additional updated copies) $20.00

The Software Dynamics Interpretive Debugger

IDB is a very sophisticated set of routines which are ideal for debugging assembly language programs. IDB allows the programmer to load and dump programs from cassette or disk, to display large blocks of memory, to examine memory locations in several display formats, to modify memory locations, to single step programs, to set breakpoints which execute on the nth pass, and many more. CPU registers may be set to desired values from keyboard. Hex arithmetic and computation of relative branches is also possible. Available in two versions, one for RAM (ORG $7000) and one for PROM (ORG $D000).

Cat. No. DBG-1-C Cassette ORG $7000 for RAM $65.00
Cat. No. DBG-1-P Paper tape ORG $7000 ..... $65.00
Cat. No. DBG-2-C Tape cassette ORG $D000 for PROM $65.00
Cat. No. DBG-2-P Paper tape ORG $D000 for PROM $65.00
Cat. No. DBG-2-E Set of 2708 EPROMS containing Debugger ORG $D000 ..... $325.00 (Requires MSI EPR-8 EPROM Board)

TSC Text Editing System For the FD-8 Disk Memory System

TSC's new text editing system is the most complete editor available for the 6800 system. The complete set of edit directives makes assembly language programming simple. Text and document preparation is also greatly simplified using this editor. This program provides the capability of inserting or deleting characters, lines of text, or blocks of text. Strings may be located and changed on all occurrences or only on specific occurrences. Long source files may be loaded from disk, edited, and resaved on disk prior to assembly. This editor is clearly the most powerful for any microcomputer system. Available from MSI in the FD-8 disk version only. Specify KC Standard tape cassette or diskette.

Cat. No. TSC-C Editor on tape cassette $25.00
Cat. No. TSC-D Editor on diskette $40.00

Reverse Assembler

The new MSI disk reverse assembler is the most powerful disassembler presently available. The program generates a complete symbol table, places equate statements at the beginning of the newly created source program, and inserts labels at appropriate locations throughout the program. The source program can be listed on the terminal or printer and stored on disk as a source program. The new source file may then be edited, relocated, and reassembled as desired. A fantastic program! Available on paper tape, cassette, or diskette, specify which.

Cat. No. REV-P Reverse Assembler, paper tape $25.00
Cat. No. REV-C Reverse Assembler, cassette $25.00
Cat. No. REV-D Reverse Assembler, diskette $40.00

Relocating Loader Program

The Relocating Loader Program is designed to load paper tape or KC Standard tape cassette programs, in MIKBUG format, into a different memory location than the one from which it was originally punched. This permits the operator to easily relocate program segments as desired.

Reloading Loader Program, available on paper tape or KC standard tape cassette, specify which.

Cat. No. RL-1C Relocating loader on cassette $15.00
Cat. No. RL-1P Relocating loader on paper tape $15.00

Utility Program For 6800 Systems

The Utility Program contains several handy routines which will be useful to the programmer. The package contains a LIST routine which allows you to display object code conveniently on your terminal or list it on your printer. One, two, or three byte instructions are listed on the same line for greater ease in reviewing the listing. A LOOK function is included to allow you to search your memory between any two desired addresses and print out the locations of one, two, or three byte code sequences. A MOVE function is included to allow you to relocate blocks of program from one memory location to another. A FILL routine is included to allow you to fill desired blocks of memory with one or two byte alternating code sequences for use in testing and debugging procedures. A CHECKSUM routine is included to allow you to quickly compute a checksum for any desired block of memory. This gives you a quick means of determining if any changes or bit drop-outs have occurred in your memory during debug operations.

Cat. No. UT-1C Utility program on cassette $25.00
Cat. No. UT-1P Utility program on paper tape $25.00

Disassembler Program

The Disassembler Program translates object code contained within the memory of a 6800 system into mnemonic symbols which are compatible with assembly-language programming. Absolute address values are calculated from relative branch instructions and are printed. When the program encounters data areas or unassigned operation codes, these are reported with the mnemonic "NO-NO" which is a signal to the user that the disassembler has lost synchronization. Any series of three inherent operations, or no-op codes, will permit the program to recover its synchronization once again. The ASCII character representation of each instruction is printed, assuming that it is a printable character. While this results in occasionally random characters appearing at the end of lines when disassembling a program, it permits the printing of the actual ASCII characters in a field of text.

This program is written using the MIKBUG input and output character routines which are documented for easy modification.

Cat. No. DA-2C Disassembler on cassette $25.00
Cat. No. DA-2P Disassembler on paper tape $25.00

Mini Assembler Program

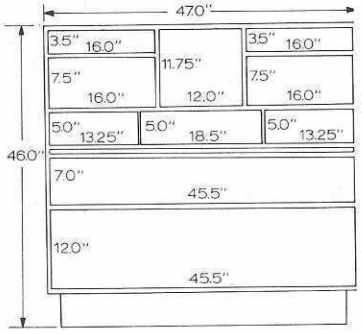
The Mini Assembler Program is designed to simplify machine-level programming on 6800 microprocessor systems. The program allows the operator to type mnemonic program symbols on the terminal directly in assembler language, while the program generates the correct object code, placing it in the proper memory location, and printing it out simultaneously on the terminal. Relative branches are calculated from the absolute address which is entered following branch instructions.

The Mini Assembler permits ASCII characters and hex codes to be entered directly into memory when desired. Typing a "%" character allows a new beginning address to be entered. The program is written to utilize MIKBUG input and output character routines.

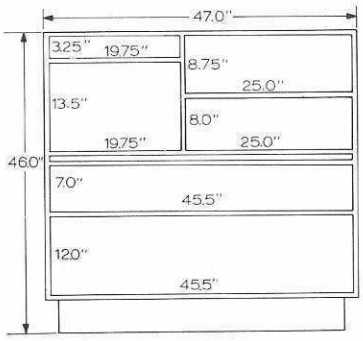
Mini Assembler, available on paper tape or KC Standard tape cassette, specify which.

Cat. No. MA-1C Mini Assembler on cassette $25.00
Cat. No. MA-1P Mini Assembler on paper tape $25.00

Computer System Cabinet

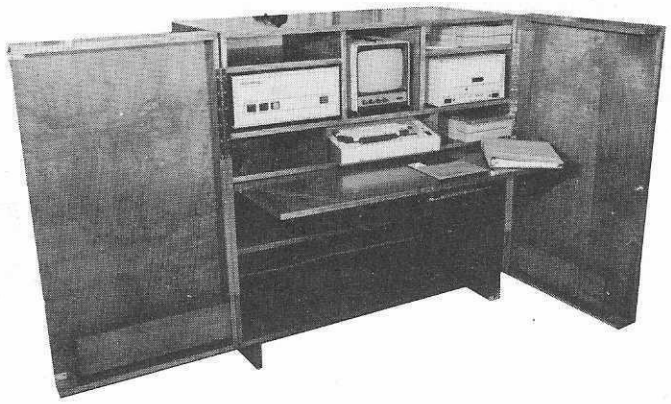


CAB-A



CAB-B

We are now offering a beautiful computer enclosure to house your system. The cabinet is offered in Walnut veneer finish which is of the highest quality and suitable for use in any home or office decor.



Overall dimensions are fixed as shown below. However, two options are available for the upper half of the cabinet which houses the equipment. Option A is desirable for systems using a small video monitor with separate keyboard, while Option B is more desirable for systems using a larger CRT. Allow 45 days for delivery.

Cat. No. CAB-A Computer Cabinet $650.00
Cat. No. CAB-B Computer Cabinet $650.00

The following programs are available for use with the FD-8 Disk Memory System. These are either delivered with the system or are available as options. Additional updated source listings are available as shown :

Cat. No.	Description	Price
MINI-L	MINIDOS	$5.00
DSKI01-L	DSKI01 (ORG $2400)	$5.00
DSKI04-L	DSKI04 (ORG $C000)	$5.00
BASDSK-L	BASDISK	$5.00
CORDSK-L	CORDISK	$5.00
COPY-L	COPY	$5.00
PACK-L	PACK	$5.00
DATFIL-L	DATFIL	$5.00
PFILES-L	PFILES	$5.00
PFILESP-L	PFILESP	$5.00
MON-L	MONITOR	$5.00
EXMON-L	EXT-MONITOR	$5.00
COMIO-L	COMIO	$5.00
DOS-L	DOS	$5.00

New Products To Be Available Soon For The MSI and SWTP 6800 Systems

MSI 16K Memory Board

The new RAM-16 16K memory board is completely unique. It has both read and write enable under software control and is pagable. Fast access RAM allowing 2 mHz system clock speeds are employed. These features make multi user applications possible without extensive software modifications.

Cat. No. RAM-16 ..... (price to be announced)

MSI Video Display Module

The new VDM-1 video display module is designed for the SS-50 bus architecture. Both upper/lower case ASCII as well as graphic displays are available in both color and black and white. The VDM-1 allows memory contents to be displayed on the screen directly.

Cat. No. VDM-1 ..... (price to be announced)

MSI Audio Cassette Interface

The AC-1 cassette interface plugs directly into the MSI interface adapter card. Using the new MSI Bug monitor software, programs may be saved and loaded on Port 1 without alteration of the baud rate of the control terminal on Port 0. The AC-1 card will also plug directly into the interface bus of the SWTP 6800 system.

Cat. No. AC-1 ..... $75.00
Cat. No. AC-1W $105.00

Real Time Clock

The RTC-1 real time clock uses a calendar clock chip which allows both time and date to be easily read into the system. The RTC-1 card plugs into the interface bus of both the MSI and SWTP 6800 systems.

Cat. No. RTC-1 ..... (price to be announced)

Questions and Answers . . .
About MSI Products

In order to provide as much information as possible, we have selected the most frequently asked questions about MSI products for inclusion in our catalog.

Questions About the MSI 6800 Computer

Q. What are the main differences between the MSI 6800 Computer and the MP 6800 Computer manufactured by Southwest Technical Products Corporation?
A. The MSI 6800 Computer is bus compatible with the SWTP 6800 system. Both use the SS-50 bus architecture. However, the MSI 6800 overcomes the engineering disadvantages associated with the MIKBUG monitor, incomplete address decoding, interface addresses in the middle of user memory, inadequate power supply, and mother board capacity. The MSI 6800 system has a 20 amp power supply and a heavy duty mother board with 16 slots and gold-plated connectors. Our CPU Board has separate baud rate and system clocks, 4K of EPROM memory and a much improved MIKBUG compatible monitor. MSI interface cards bring all strappable options to a DB-25 connector on the rear panel via a ribbon cable connector. This permits any terminal to be plugged into the computer without alteration of the interface card. Other advantages of the MSI 6800 are described in this catalog.

Q. Can I use my SWTP memory boards and interface boards in the new MSI 6800 Computer?
A. Yes, since the bus architecture is identical, they will work fine.

Q. Can I use the MSI 6800 mother board and power supply only to beef up my SWTP 6800 system?
A. Yes, the MSI mother board (MB-1) has the same hole centers as the SWTP mother board and will mount easily in the SWTP chassis. However, the MSI interface adapter board (IA-1) must also be used to furnish an interface bus. The MSI power supply (PS-1) may also be used to replace the SWTP supply.

Q. Is the MSI 6800 available wired and tested?
A. Yes, see catalog listings.

Q. Can I use the MSI CPU card in my SWTP 6800 system in order to gain a faster system clock and on board EPROM memory?
A. Yes, however the MSI power supply should also be used in order to adequately supply the EPROM memory. A MIKBUG replacement monitor must also be used if interface addresses used by MIKBUG are to be retained.

Questions About the FD-8 Disk Memory System

Q. I have an SWTP 6800 System. What is needed to hook up your FD-8 Floppy Disk Memory to my system?
A. The FD-8 Disk Memory System interfaces to any microprocessor system via a single PIA chip. For the SWTP 6800 System, we furnish our PIA-1 interface card which plugs in directly to port 7 of the interface bus. A ribbon cable then plugs into the interface card and to the disk.

Q. What software is provided with the FD-8 Disk System?
A. MSI provides a complete disk operating system software package for use with 6800 based microprocessor systems. The operating system gives the user the capability of having named files at three levels: object code files, source code files for the assembler, and BASIC files. The system contains a coresident assembler/editor which can pull source files from disk, assemble, and pass object code to either tape cassette or disk memory. Password protection is available for both program as well as random and sequential data.

The new TSC editor is now available in a MSI FD-8 disk version. This excellent editor allows very long source files to be stored on disk, edited, and assembled with the object code being placed on disk as well.

In BASIC, both program as well as random and sequential disk data files are available. All files are named with optional password protection. Other basic programs on disk can be chained to or called as subroutines from a parent program.

Q. What charges are made for software, and what documentation do I receive?
A. The complete disk operating system, including the coresident assembler/editor are provided free of charge with the purchase of an FD-8 Disk System. A $65.00 charge is made for MSI BASIC. An operating manual for disk operating system, assembler/editor, and BASIC is provided. Partial source documentation is also provided for the input and output routines and other appropriate addresses. In addition, complete source documentation is provided for the disk driver subroutines and MINIDOS which allows the user to read or write any desired sector or number of sectors from any beginning disk location to any destination in computer memory. This enables the user to have access to the disk in his own assembly language programs or by direct communication with the control terminal completely independently from the MSI disk operating system.

Q. Is it possible to interface the FD-8 Floppy Disk to microcomputer systems using the 8080, Z80, or 6502 processors? If so, do you provide the technical details on interfacing?
A. The FD-8 can be connected to any microprocessor via a single PIA chip interface. Electronically, there is no difficulty in interfacing to any system since transfers between the disk and the host computer are carried out via a sector buffer RAM on the disk controller card. Information transfer is under the control of a crystal clock on the controller board, thus making the FD-8 completely independent from processor speed or clock frequency. It is possible to interface the FD-8 using parallel data ports without a PIA chip, however, the software for interfacing has already been written for both 8080 and 6800 systems using a PIA interface. Since some of the ports are used bi-directionally, the PIA interface provides an overall simplification of the interfacing problem.

Q. What software is available for 8080 systems?
A. MSI provides complete source listings and documentation for MINIDOS and the disk driver subroutines which have been written for the 8080. This allows the user to have complete access to the disk to write any desired sector or number of sectors from any desired starting location to any desired destination memory address. A complete 8080 based disk operating system is not yet available.

Q. Is your FD-8 Floppy Disk double density?
A. The MSI Floppy Disk uses the GSI Model 110 drive which has the capability of operating in the double density mode. However, double density operation requires data to be written using a modified FM technique. This requires special data separator and data writing circuitry which is not contained within the present version of the FD-8. Double density version of the FD-8 will be introduced at a later time.

Questions...

Q. What kind of diskettes do you recommend for use with the FD-8?
A. We have our diskettes manufactured by the Dysan Corporation. They are packaged for us under the MSI label and have proven to be the most reliable diskettes available for use with the FD-8. We have tried other manufacturers but have found none to be as reliable as Dysan. We pay more money for Dysan diskettes and, as a result, cannot offer them at a price quite as competitive as some other manufacturers. However, we feel that the reliability is most important.

Q. Does the FD-8 use IBM compatible format?
A. The FD-8 is not IBM compatible since we use hard-sectoring on the diskette. Our format uses 16 sectors of 256 data bytes each per track. In addition, track and sector identification, checksum (CRC), and other error checking information is written on each sector in addition to the data. This gives a total capacity of 315,392 bytes of data which can be stored per diskette.

Q. What are diskette hardholes, and what do they do?
A. Hardholes are small mylar doughnuts which may be affixed to the center hole of a diskette for additional protection. It is possible to damage the center hole of a diskette if it is not properly centered at the time the disk drive door is closed. The mylar doughnut serves to reinforce the center hole of the diskette and give it additional protection against damage. The hardhole also provides for additional friction between the diskette and the clamping hub in order to provent slippage of the diskette during rotation.

Q. Does MSI offer application software packages?
A. MSI is in the process of developing application software for use with the FD-8 System. We will be offering a library of standard business programs for accounting, inventory and mail list applications in the near future. These programs will be written in BASIC using the disk data file capability of the FD-8. The availability of application software will be announced in periodic MSI newsletters and will be made available to FD-8 users for a small copying charge plus the cost of the diskette.

Q. Does a user program library exist for the MSI FD-8 Disk System?
A. We are in the process of organizing a user group for the FD-8. Users of the FD-8 System are encouraged to submit programs which may be included in the user library. Membership in the user group may be achieved by either submitting a program for publication or by payment of a nominal membership fee. Membership then entitles the user to receive periodic listings of user library contents and newsletters. Programs contained within the user library will be made available for a small copying charge.

Q. What is the difference between MSI TAPE BASIC and MSI BASIC used with the FD-8 Disk System?
A. We have added several features to the MSI version of BASIC. We offer multiple statements per line, user defined verbs, a string-length command which allows strings up to 128 characters to be used, and have increased the speed of execution. In addition, we have completely removed the dependence upon the MIKBUG ROM and MIKBUG RAM areas. The stack pointers have been moved to the user program area, and the input/output routines for each of the ports are fully documented so that these can be easily changed. Interrupts are now allowed and can be used to vector the program to a user subroutine and then return to BASIC. We are also developing multi-user BASIC which will be released in the near future.

Q. Can MSI BASIC and the disk operating system be relocated?
A. Essentially, no difference exists between the two versions of BASIC insofar as the BASIC interpreter is concerned. The tape version has disk and DOS commands removed from its library. The interpreter resides from memory location $0100 to $1FFF in both versions. In addition, memory locations below $0100 are used as pointers. In the Disk version, memory locations from $2000 - $2FFF are used to contain disk driver subroutines, DOS, and other file handling routines. User memory begins at $2000 for the tape version and $3800 in the Disk version of BASIC.

Q. What is the difference between SWTP 8K BASIC and MSI BASIC?
A. It is not considered feasible to attempt relocation of these programs since so many of the individual routines which are used in the disk operating system are integrated. It would require a major revision of the disk operating system, BASIC, coresident assembler/editor and other associated utility programs before such a relocation could be performed. However, a version of MSI BASIC will soon be available on PROM which will reside at a high memory location.

Q. How difficult is it to run MSI BASIC and the disk operating system on the Motorola Exorciser, or other 6800 based microcomputer systems?
A. The primary changes which must be made are in the input and output character routines. These routines must be changed in all MSI software so as to be compatible with the system on which software is running. In addition, the PIA Interface which communicates with the disk, the FD-8, is presently located at memory address $801C. A PIA residing at this address will also be necessary, or alternatively, this address must also be changed in the disk driver subroutines. Several different versions of the MSI software package are currently being developed for use with other 6800 systems.

Q. Will MSI BASIC handle tape commands as well as disk?
A. Yes, the commands TSAVE AND TLOAD are used with the tape, whereas the commands SAVE and LOAD are reserved for use with the disk. It is also possible to place a label at the front of a block which is saved on tape. When this label is specified during a LOAD operation, the program will search for the appropriate block on tape before loading in the information which has been stored on the tape.

Q. Will MSI BASIC handle data files?
A. Yes, both random and sequential data files are available for the disk system under MSI BASIC. Named files for object code, source code, BASIC program, and BASIC data files are all available.

Q. I have heard that 1702A PROMs are too slow for use with 6800 systems running at full clock speed. Is this true?
A. This is not true, if the memory addressing scheme employed by MSI is used to address the 1702A PROMs. The MSI PROM/RAM Board does not employ Phase 2 of the clock in the memory addressing scheme. This permits a tolerable memory access time of approximately 900ns. MSI uses 650ns access time 1702A PROMs in all applications. This provides completely satisfactory reliability of operation. We have experienced no problems whatsoever when using fast 1702As.

Q. Can I buy a Bootstrap routine on PROM in order to bring the disk system into operation quickly?
A. Yes, MSI is presently delivering a 512 byte Bootstrap Program known as Short Boot. This routine is available on a two-PROM set using 1702A PROMs for use with the MSI PROM/RAM Board. Short Boot and the PROM Board are delivered with most Disk Systems. This allows the disk to be placed into operation by simply executing the Bootstrap routine which is orged at $C000. The system then responds immediately with DOS READY and programs may then be called immediately by file name.

Q. I am interested in purchasing MSI software but am having a hard time evaluating its usefulness. May I purchase the documentation for your disk system and BASIC separately for evaluation?
A. Yes, the complete operating manual for the FD-8 Disk System may be purchased separately for $35.00. This manual includes assembly instructions, theory of operation, software operating instructions and listings, disk commands, and the MSI BASIC manual. If the FD-8 System is then purchased at a later date, a credit memo will be issued for the manual which has already been purchased.

Q. How much memory is required for use with the FD-8 Disk Memory System?
A. We recommend a minimum of 16K with 20 or 24K being more desirable. The BASIC interpreter or coresident assembler/editor resides between memory locations $0100 and $1FFF. The disk operating system and disk driver subroutines reside from $2000 to approximately $2FFF. A small amount of memory at $3000 is also used by the disk operating system; however, most of the area above $3000 is devoted to user program area for either BASIC program files or source files. In order to have adequate user program area for most BASIC files and source files of any length, at least 20K is desirable. A system may be checked out for proper operation with 16K. The memory area between $2400 and $2FFF must be protected at all times in order to avoid writing over the disk operating system software. If this area is written over, then the DOS routines must be bootstrapped in once again before the disk can be used.

Q. What are expected delivery times and terms of payment for MSI products?
A. After placing an order, delivery times are 30 days or less on most products. Terms are cash with order, (Master Charge and Bank Americard accepted), or C.O.D. unless credit approval has been obtained. Purchase orders from companies and institutions should be accompanied by credit references and a bank reference if net 30 days is requested.

Here Is A List Of MSI Dealers Who Can Show You Our Products In Action

Midwest Scientific Instruments

220 West Cedar
Olathe, Kansas 66061
913/764-3273
TWX 910 749 6403 (MSI OLAT)
TELEX 42525 (MSI A OLAT)

Arizona

Personal Computer Place
1840 W. Southern
Mesa, Arizona 85202

California

A-Vidd Electronics
2210 Bellflower Blvd.
Long Beach, California 90815

Computerland of San Mateo
42 W. 42nd Ave.
San Mateo, California 94403

Florida

Microcomputer Systems
144 S. Dale Mabry Highway
Tampa, Florida 33609

Illinois

American Microprocessors
Equipment & Supply Corporation
20 N. Milwaukie
Half Day, Illinois 60069

Computerland of Arlington Heights
50 E. Rand Road
Arlington Heights, Illinois

4C Corporation
P.O. Box 530
Mundelein, Illinois 60060

Lillipute Computer Mart, Inc.
4446 Oakton St.
Skokie, Illinois 60076

Midland Standard
P.O. Box 38
603 E. Chicago St.
Elgin, Illinois

Wysocki Electric
6563 11th St.
Rockford, Illinois 61109

Iowa

Electronic Data
1200 Locust
Des Moines, Iowa 50301

Kansas

Barney & Associates
Electronics Division
425 N. Broadway
Pittsburg, Kansas 66762

CMPTR-C
704 Taylor
Topeka, Kansas 66604

Louisiana

Freeman Electronics
1100 Ridge Ave.
West Monroe, Louisiana 71291

Gallion Data Systems
3103 Malvern
Bossier City, Louisiana 71111

Maryland

Computer Workshop
1776 E. Jefferson
Rockville, Maryland 20852

Missouri

Gallion Data Systems
201 N. 11th St.
Blue Springs, Missouri 64015

H & K Systems
15 E. 31st St.
Kansas City, Missouri 64108

Montana

Compact Computers
113 Hamilton
Butte, Montana 59701

New York

Computer Mart of New York
118 Madison Avenue
New York, New York 10006

Oklahoma

High Technology
1020 W. Wilshire Blvd.
Oklahoma City, Oklahoma 73116

Pennsylvania

The Electronics Place
7250 McKnight Rd.
Pittsburgh, Pennsylvania 15237

Gallion Data Systems
908 Knepper Drive
Mechanicsburg, Pennsylvania 17055

Texas

The Computer Shop
6812 San Pedro
San Antonio, Texas 78216

Washington

Digitek
5950 Sixth Avenue South
Suite 101
Seattle, Washington 98108

Midwest Scientific International

(Belgium)

Chausee de Charleroi, 80
1060 Brussels, Belgium
Tel (02) 537.77.69
Telex: 26025 (BUROB B)

Canada

First Canadian Computer Store
44 Eglinton Avenue West
Toronto, Ontario M4R 1A1
Canada

England

Strumech Engineering
Electronics Division
Portland House
Coppice Side, Brownhills
Walsall Staffordshire
England

Computer Workshop
174 Ifield Rd.
London, England SW109AG

Germany and Austria

C.O.I. Systeme Munchen
EDV Vertriebsgesellschaft mbH
ArabellastraBe 5
8000 Munchen 81
Germany

Belgium

Computer Resources
Chausee de Charleroi, 80
1060 Brussels, Belgium

Switzerland

Agence De Distribution et Vente
Case Postale 801
1211 Geneve 1
Switzerland

Australia

Sontron Instruments
Byte Shope
17 arawatta St. Carnegie
Victoria, Australia 3163

The Netherlands

MRL Ectronics
Postbus 88-Delft, Foulkeslaan 100
The Netherlands

South Africa

Radiokom
Cnr. George St. &
Hendrik Verwoerd Dr.
Randburg, Transvaal
South Africa

Venezuela

Tramboca (Sistema Pek 2000)
Centro Peru, PISO 2-Ofic. 23
Caracas, Venezuela